

Chapter 4: C.S. Reconstruction

Bloodstain Pattern Analysis

Forensic Science

Prof. Espinosa

Learning Objectives

By the end of this exercise, the student will be able to:

- Define crime scene reconstruction
- List and identify the information that can be retrieved from blood stains found at the crime scene;
- Infer the angle of impact;
- Predict the origin of impact;
- Examine and distinguish the various types of blood stains;

Directions: Blood Stain Worksheet # 1

- Log into Blackboard.
- Go to Course Materials/Week 3/Lectures.
- Click on Worksheet 1 to download.
- Read through the slides.
- Pay special attention to the pictures and understand the meaning in each picture.
- Type in your answers onto the Worksheet.
- Note that the information in this presentation is also needed for Worksheet #2.
- Make sure type in your name and section on the top of the sheet.
- Submit via SafeAssign Link.

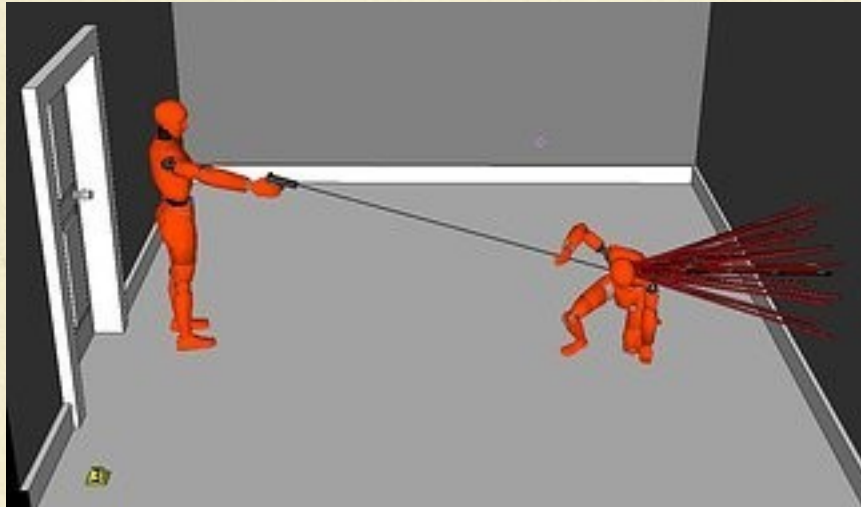
Introduction



- Bloodstain patterns are usually found in violent crimes.
- The bloodstains left at a crime scene can be interpreted to uncover the following information:
 - The direction from which the blood originated
 - The angle at which a blood droplet struck a surface
 - The location or position of a victim
 - The movement of a bleeding individual
 - The minimum number of blows that struck the victim
 - The approximate location of the suspect delivering blows that produced a bloodstain pattern

Crime Scene Reconstruction

- The method used to support a likely sequence of events by the observation and evaluation of physical evidence, as well as statements made by those involved with the incident, is referred to as reconstruction.

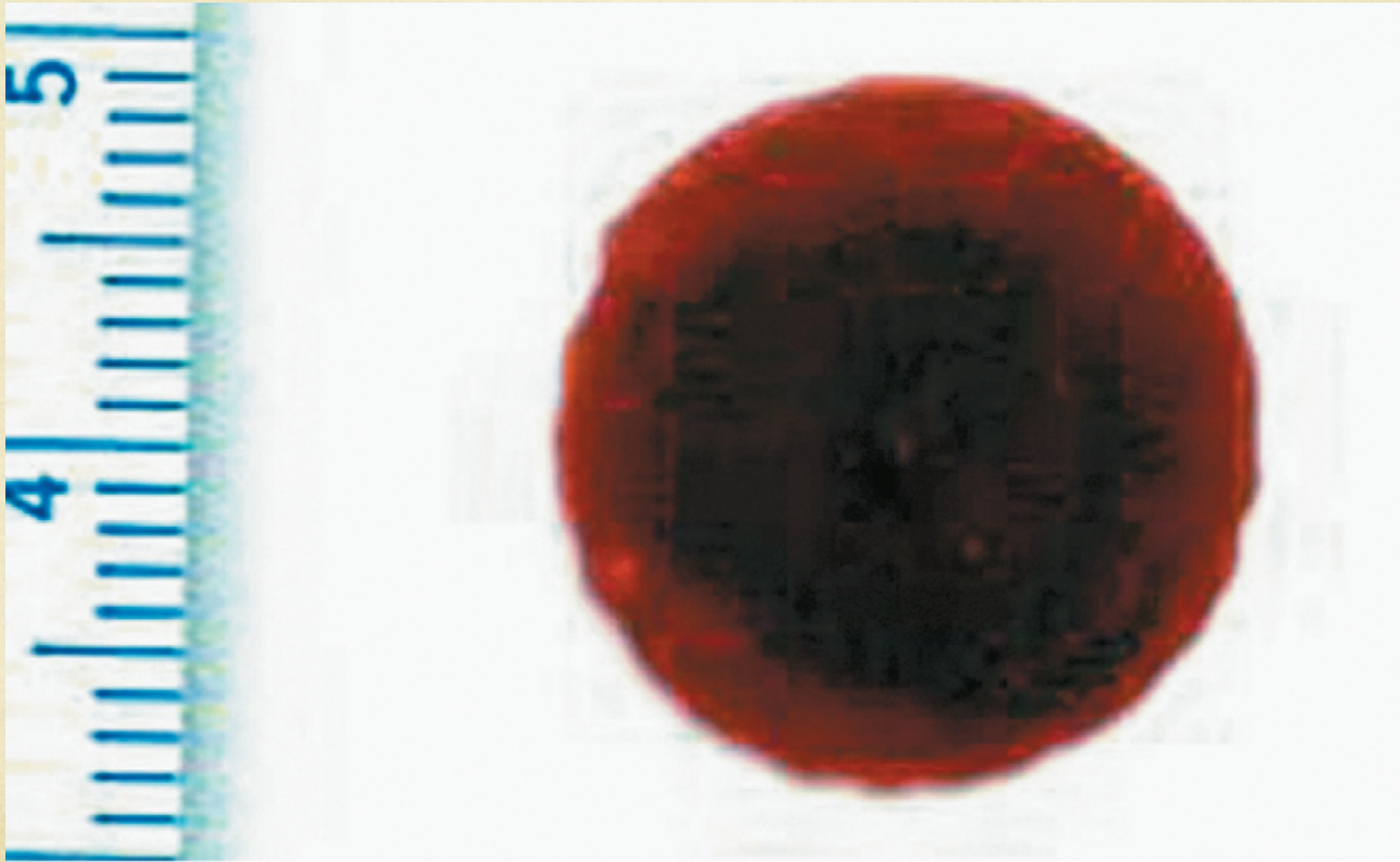


- Crime-scene reconstruction relies on the combined efforts of medical examiners, criminalists, and law enforcement personnel to recover physical evidence and to sort out the events surrounding the occurrence of a crime.

Stain Patterns of Blood

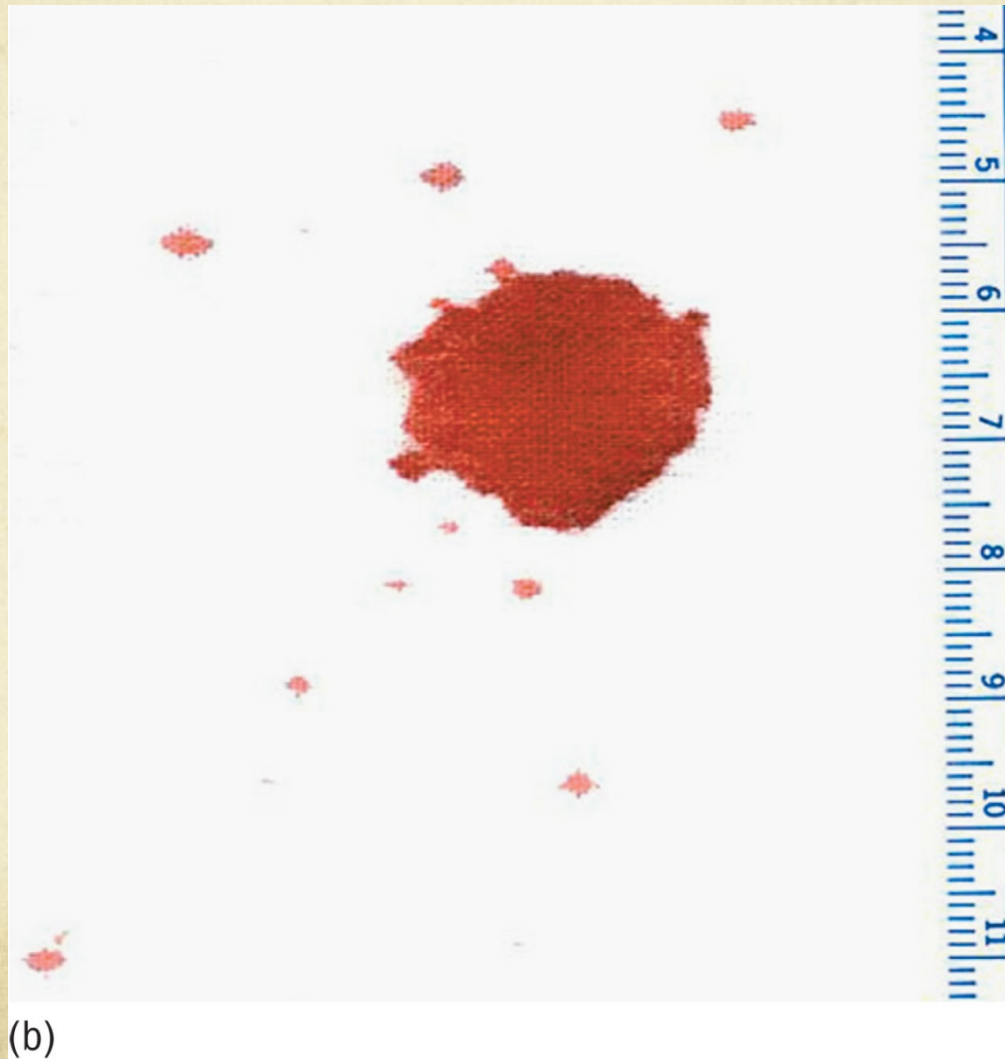
- The crime scene investigator must remember that the location, distribution, and appearance of bloodstains and spatters may be useful for interpreting and reconstructing the events that produced the bleeding.
- **Surface texture** and the stain's shape, size, and location must be considered when determining the direction, dropping distance, and angle of impact of a bloodstain.

FIGURE 4-2a A bloodstain from a single drop of blood that struck a glass surface after falling 24 inches. *By A.Y. Wonder*

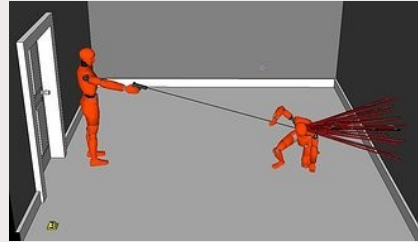


(a)

FIGURE 4-2b A bloodstain from a single drop of blood that struck a cotton muslin sheet after falling 24 inches. *By A.Y. Wonder*



Impact Bloodstain Spatter Patterns

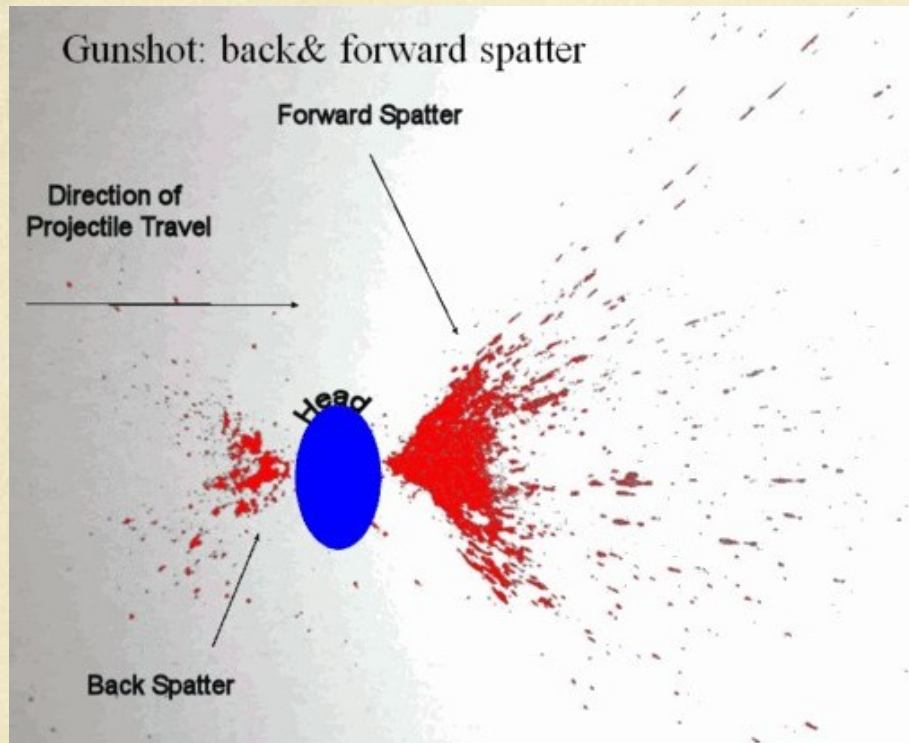
Bloodstain Pattern	Description	Example
Impact Spatter	Bloodstain pattern is produced when an object makes a forceful contact with a source of blood.*	Bat coming in contact with the victim's head.
Forward Spatter	Blood travels in the <u>same direction</u> as the force caused by the spatter.	 A diagram illustrating forward spatter. It shows a room with a doorway on the left. An orange stick figure stands in the doorway, holding a long, thin object (like a bat) horizontally. Another orange stick figure is on the floor in the center of the room, with a spray of red lines radiating from their head area towards the right wall, representing blood spatter in the direction of the force.
Back Spatter	Blood travels <u>back to the source</u> of the force.	Entrance wound produces blood that is deposited on the person creating the wound.

*most common type of bloodstain pattern

FIGURE 4-6a The action associated with producing impact spatter. *By A.Y. Wonder*

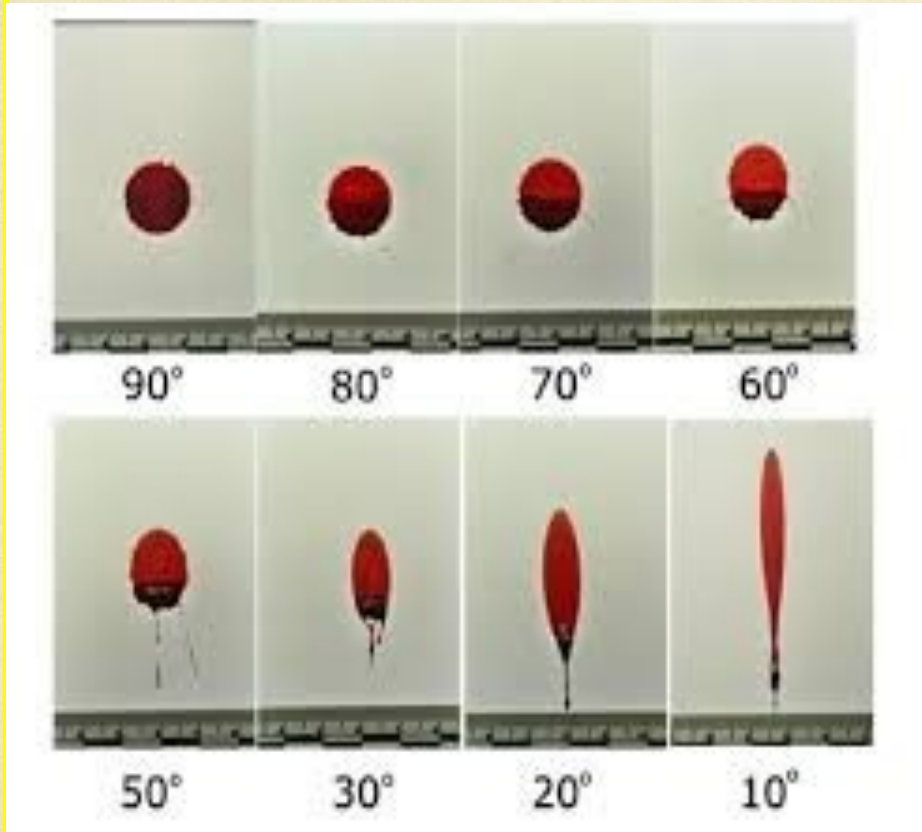


Back and Forward Spatter



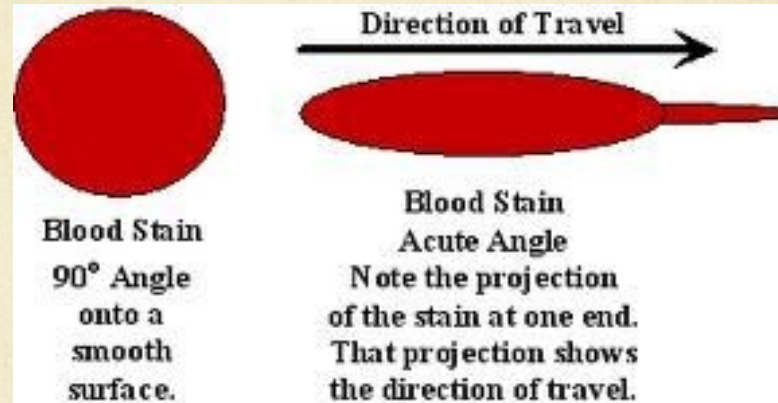
- In picture above, the gunshot is moving from left to right. Forward spatter moves in the same direction as the gunshot.
- Back spatter moves toward the gunshot.
- A shooting may leave a distinct gunshot spatter pattern. This may be characterized by both **forward spatter** from an exit wound and **back spatter** from an entrance wound.
- The location of injury, the size of the wound created, and the distance between the victim and the muzzle of the weapon all affect the amount of back spatter that occurs.

Angle of Impact



- It is possible to determine the angle of impact from a blood stain on a flat surface.
- A drop deposited at an angle of about 90 degrees will be circular in shape with no tail or buildup.
- A drop that deviates from 90 degrees will become elongated in shape.

Direction of Bloodstain Pattern



- An investigator may discern the direction of travel of blood striking an object by studying the stain's shape.
- As the stain becomes more elliptical, its direction of impact becomes more discernable.
- The pointed end of a bloodstain faces its direction of travel.

FIGURE 4-4 The higher pattern is of a single drop of human blood that fell 24 inches and struck hard, smooth cardboard at 50 degrees. On this drop the collection of blood shows the direction. The lower pattern is of a single drop of human blood that fell 24 inches and struck hard, smooth cardboard at 15 degrees. On this drop the tail shows the direction.



Directionality and Angle of Impact

Mathematically, the angle of impact can be calculated by the equation and determining the inverse of Sine A:

$$\sin A = \frac{\text{Width of blood stain}}{\text{Length of blood stain}}$$

The Origin of Blood Spatter

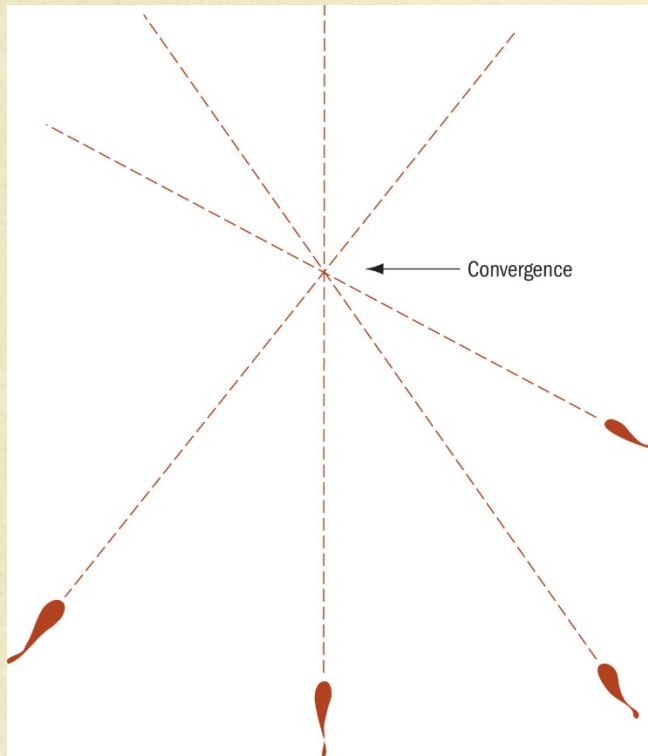
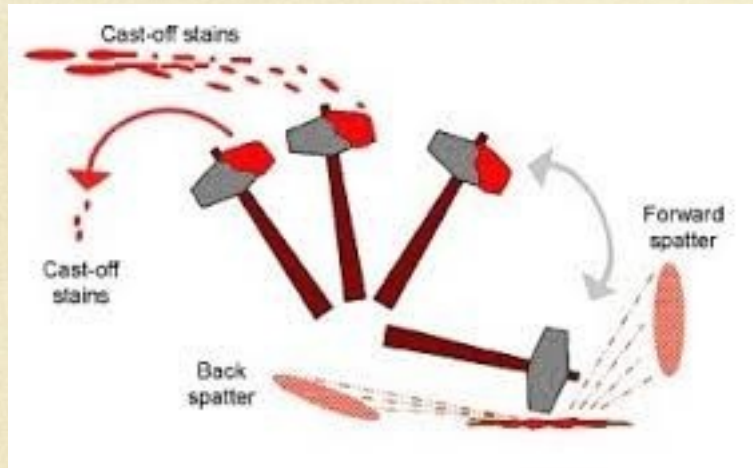


Figure 4–7 Illustration of stain convergence on a two-dimensional plane. Convergence represents the point from which the stains emanated.

Courtesy Judith Bunker, J. L. Bunker & Assoc., Ocoee, FL

- The origin of a blood spatter in a two-dimensional configuration can be established by drawing straight lines through the long axis of several individual bloodstains.
- The intersection or point of convergence of the lines represents **the origin point**.

Stain Patterns of Blood



- A cast-off pattern is created when a blood-covered object flings blood in an arc onto a nearby surface.



- Arterial spray spatter is created when a victim suffers an injury to a main artery or the heart. Commonly, the pattern shows large spurted stains for each time the heart pumps.

FIGURE 4-6b The action associated with producing cast-off spatter. *By A.Y. Wonder*



FIGURE 4-11 Arterial spray spatter found at a crime scene where a victim suffered injury to an artery. *Norman Reeves, BPA Consulting, Tucson AZ, www.bloody1.com*



Stain Patterns of Blood

- A pattern created by blood that is expelled from the mouth or nose from an internal injury is called an expirated blood pattern.
- A void is created when an object blocks the deposition of blood spatter onto a target surface or object.
- Patterns made by drops or large amounts of blood flowing by the pull of gravity are called flows.

Stain Patterns of Blood

- When an object with blood on it touches one that does not have blood on it, this produces a contact or transfer pattern.
 - **Examples of transfers** with features include fingerprints, handprints, footprints, footwear prints, tool prints, and fabric prints in blood.

More Blood Stain Patterns

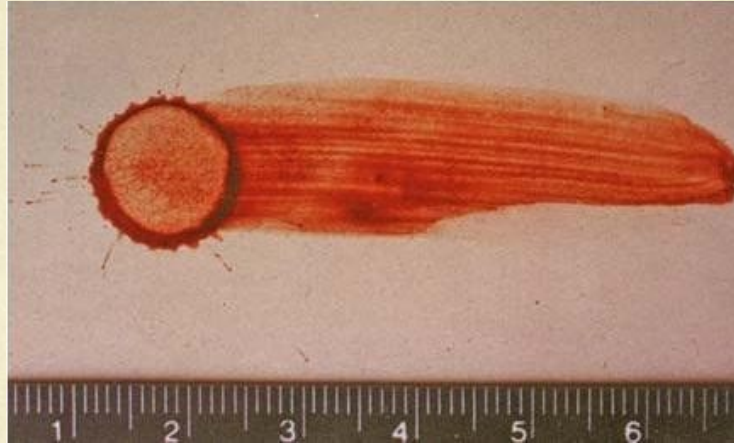


- A pool of blood occurs when blood collects in a level (not sloped) and undisturbed place.

More Blood Stain Patterns

- The edges of a stain will dry to the surface, producing a phenomenon called skeletonization.
- A trail pattern is a series of drops that are separate from other patterns, formed by blood dripping off an object or injury.

More Blood Stain Patterns



- Which pattern does this illustrate?
 - (Hint: Read the previous slide).

FIGURE 4-15 A series of swipe patterns moving from right to left. *By A.Y. Wonder*



Documenting Bloodstain Evidence

- Investigators should note, study, and photograph each pattern and drop of blood to accurately record the location of specific patterns and to distinguish the stains from which laboratory samples were taken.
- The investigator should create photographs and sketches of the overall pattern to show the orientation of the pattern to the scene.
- **Two common methods of documenting bloodstain patterns** are the *grid method* and the *perimeter ruler method*.

FIGURE 4-19 The grid method may be used for photographing bloodstain pattern evidence.

R. R. Ogle, Jr., *Crime Scene Investigation and Reconstruction*, 3rd ed., Prentice Hall, Upper Saddle River, N.J., 2011

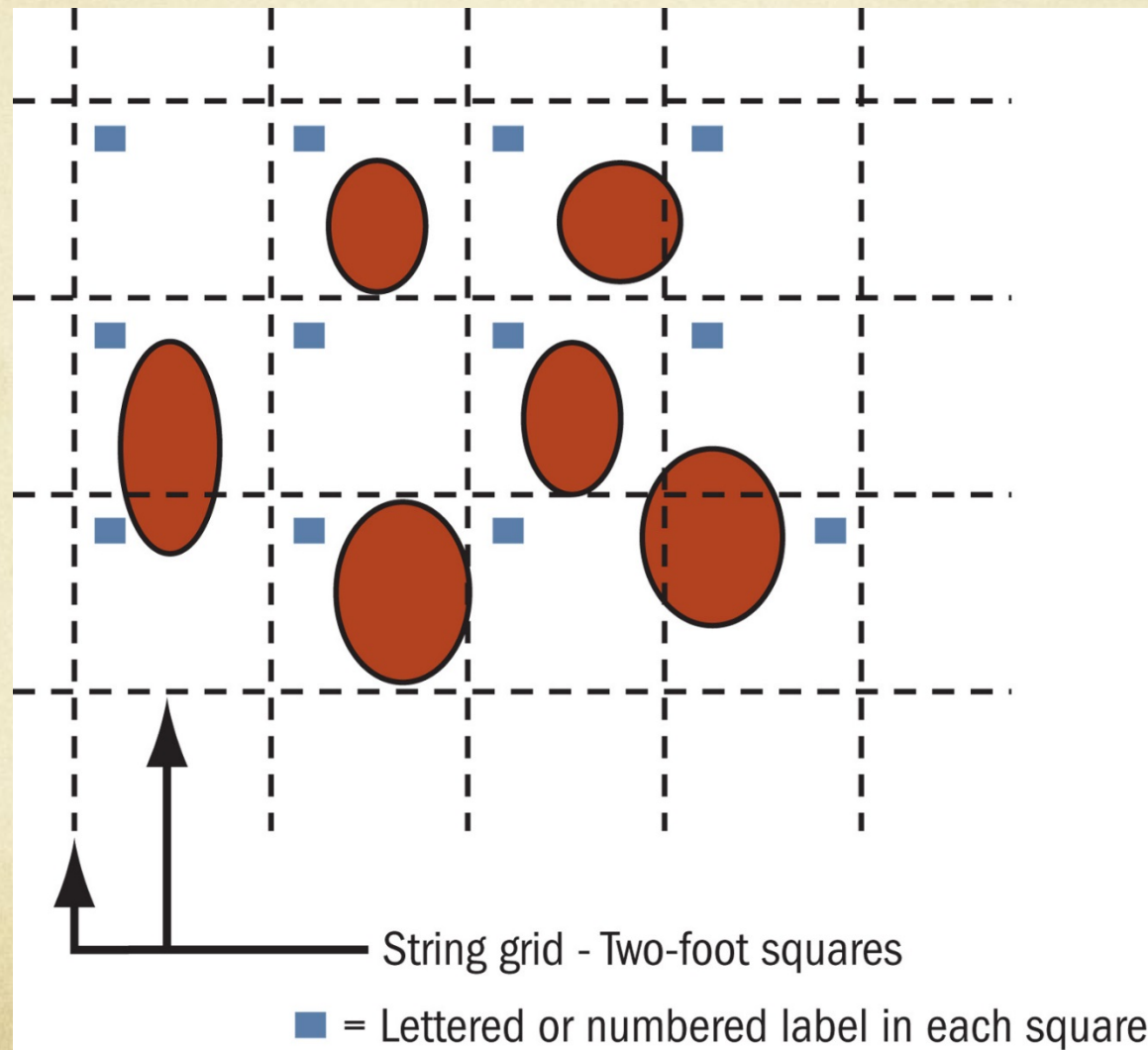
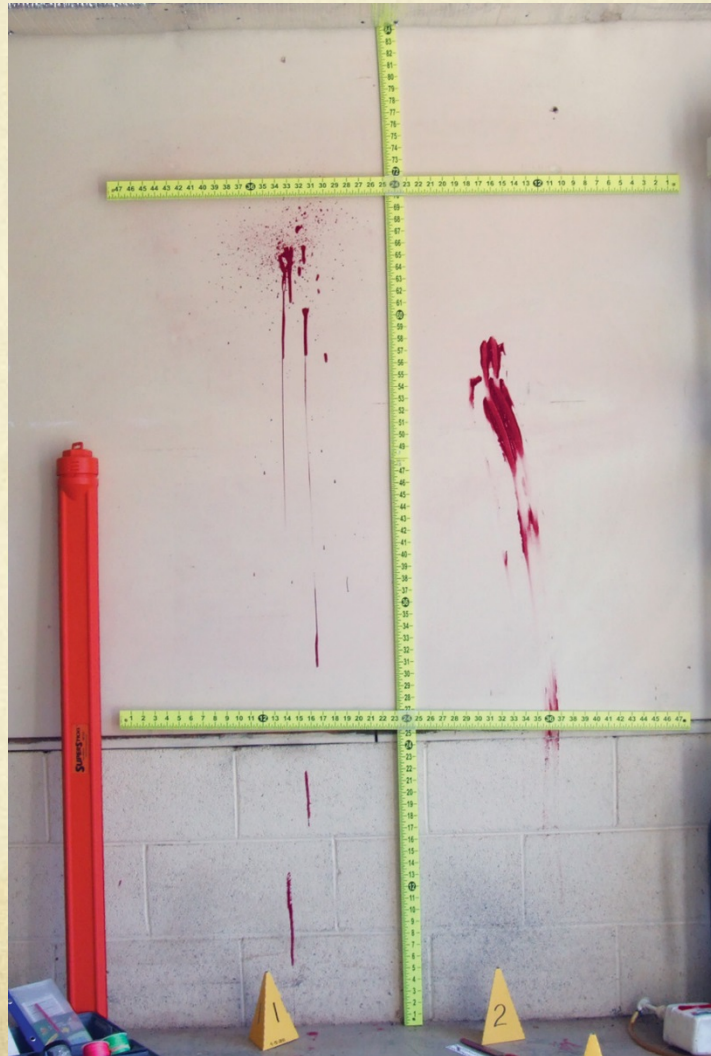


FIGURE 4-20 The perimeter ruler method may be used for photographing bloodstain pattern evidence.

*Courtesy Evident, Union Hall, VA 24176-4025,
www.evidentcrimescene.com*



Bloodstain Formations Web-Extra

- This interactive link will illustrate:
 - angles of blood drops;
 - the elongation or roundness of a blood drop depending on the height from which the blood droplet fell.
- This is an interactive link to bloodstain formation:
http://media.pearsoncmg.com/ph/chet/chet_criminal_justice_1/assets/review/bloodspatters/index.html
- The link has been provided for you on BlackBoard.
- Go to BlackBoard now to complete Part 2.
- Click on the link.
- Go through each of the three tabs. Read and follow directions.